

9163

With the Author's Compliment ^A

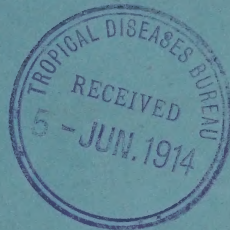
3684

[From the PROCEEDINGS OF THE ROYAL SOCIETY, B, VOL. 87, 1914.]

A New Malaria Parasite of Man.

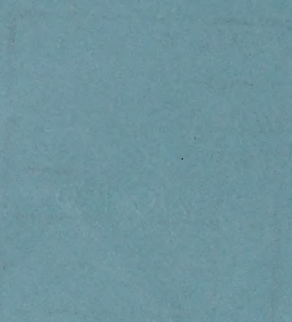
By J. W. W. STEPHENS, M.D.

WELLCOME INSTITUTE LIBRARY	
Coll.	we!TROmec
Call	Pam
No.	WC 750
	1914
	S83 ₂



22200128383

THE UNIVERSITY OF CHICAGO PRESS



THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

A New Malaria Parasite of Man.

By J. W. W. STEPHENS, M.D., Sir Alfred Jones Professor of Tropical
Medicine, University of Liverpool.

(Communicated by Sir R. Ross, K.C.B., F.R.S. Received January 19,—
Read February 19, 1914.)

[PLATES 14-16.]

In the autumn of 1913 Major Kenrick, I.M.S., kindly sent me, from Pachmari, Central Provinces, India, a blood slide from a native child, containing numerous malaria parasites. On examining these, which I at first took to be malignant tertian parasites, the suspicion arose in my mind that there was something peculiar about their appearance. I happened just previously to have been studying a blood slide from Rhodesia, containing very numerous malignant tertian parasites. The peculiarity of the Indian parasite, as far as I could at first define it, was that it was an irregular parasite as compared with the regular, almost monotonous, contour of the "rings" of the malignant tertian parasite (*Plasmodium falciparum*). I proceeded then to study the Indian parasite more carefully; and, after daily observations for many weeks of it, and of control malignant tertian parasites from various sources, I came definitely to the conclusion that it was unlike any malignant tertian parasite that I had ever seen or that I could find figured in the text-books or journals. I also considered carefully the possibility of its being the simple tertian parasite, but to this point I shall return later. During this study, in order to fix my impressions, I drew 150 consecutive parasites from the Indian slide and the Rhodesian slide respectively, as the former appeared in the field of view of an ocular so restricted by placing a diaphragm in it that only half a dozen red cells were visible in the field at a time, thus effectively preventing any selection on my part. I reproduce as pen-and-ink drawings 35 of each series taken at random, as they show very well in a general way the different aspect of the two parasites. For the same purpose I also drew a number of young simple tertian parasites.

I now proceed to define as far as possible in detail the peculiarities of this parasite.

1. It is *extremely amœboid* (judging from the stained specimens). Thin processes often extend across the cell or occur as long tails to more or less ring-shaped bodies. These processes may be several in number, and may

give the parasite most peculiar fantastic shapes like that of an irregular web or mesh.

2. The *cytoplasm* is always scanty, *i.e.* the individual amœboid processes are delicate or thin, and the parasite has but little bulk, or density. While forms resembling "rings" do occur, yet, owing to the abundance of all kinds of irregular forms, it is certainly difficult to find quite typical "signet" rings. Laterally applied parasites (*accolés* of French authors) also occur, but in them the chromatin is not dot-like, as it usually is in the malignant tertian, but practically always rod-like.

3. The *nuclear chromatin* is out of proportion to the volume of the parasite. It takes the form of bars or rods, strands, curves, forks, patches, etc.; the occurrence of the chromatin in a dot, as in the "ring" forms of other species, is rare. In the web-like protoplasmic processes mentioned above there may be seen several chromatin strands, and not uncommonly one observes a minute dot of chromatin some way from the parasite, or between two portions of the parasite, though the protoplasmic process connecting it with the main mass or masses is so thin as to be invisible. The chromatin masses are frequently angular, the angles jutting into the points at which an amœboid process is given off. Abundance of, and marked irregularity in distribution of, the chromatin masses are characteristic of this parasite.

I reproduce in a coloured plate the peculiar forms of this parasite, as it is very difficult, if not impossible, to describe them in words.

I next consider in what respects this parasite in my opinion differs from the hitherto described parasites of malaria.

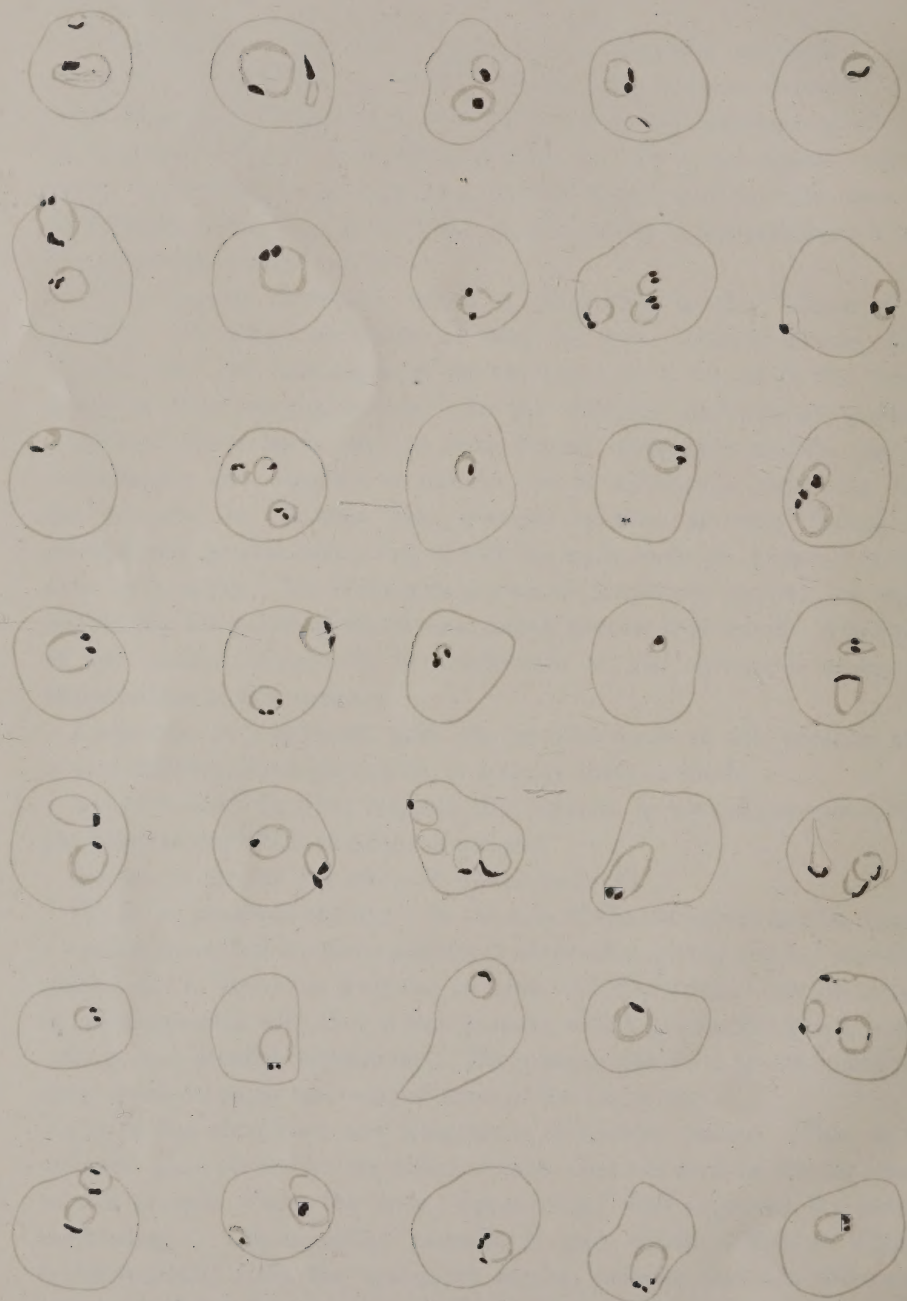
Malignant Tertian Parasite.—It differs from this

(1) In its amœboid activity. In the case of the malignant tertian parasite a certain amount of amœboid activity is observable, giving rise to "star-fish" shapes, and to somewhat irregular or even bacillary forms; but the activity is not comparable with that of this parasite, which has for this reason a most strange and peculiar appearance. The picture produced by the splash of a drop of ink on paper may suggest some of the forms seen.

(2) In the abundance and irregularity of nuclear matter. This, as the coloured plate shows, is very different from what one finds in the malignant tertian parasite, where the term "signet rings" well expresses the general morphology. The quotidian parasite, if such exists, differs so slightly morphologically from the malignant tertian parasite that the differences just pointed out between this Indian parasite and the malignant tertian apply equally to it.

Simple Tertian Parasite.—It differs from this in the following respects:—





Plasmodium fulciparum.

x 2300. (approx.)



Plasmodium tenue.

x 2300. (approx.)



Plasmodium tenue.

x 2300. (approx.)

- (1) Its *bulk* is much less, *i.e.* it is a smaller parasite.
- (2) The *amœboid processes* are far more delicate.
- (3) The *chromatin* shows a relative abundance, an irregularity and a peculiarity of arrangement (*e.g.* strands, rods and bars) not seen in the simple tertian parasite.
- (4) *Typical rings* are absent or exceedingly rare.

I am not sure whether this parasite enlarges the cell, as, although in some cases I found infected cells larger than non-infected ones in their vicinity, in other cases the reverse held good. I am uncertain also whether it is pigmented or not. I have found no parasites in which I could certainly detect pigment; but, on the other hand, I found three pigmented leucocytes in the film, which leucocytes may be associated with this parasite or may result from an associated infection. Finally, I am in doubt as to whether it produces any change in the red cell such as Schüffner's dots. During the course of my examination of this film I must have observed many thousand parasites, but among these I encountered only one infected cell which was clearly enlarged and which showed Schüffner's dots. The bulk of this parasite was much greater than that of any other I had seen, whereas the chromatin masses (two in number, one large, one small) were small compared to the bulk of the parasite. Although I could detect no pigment in this parasite I was not otherwise able to distinguish it from a simple tertian parasite.* These points then must remain unsettled until further material is forthcoming.

Quartan.—Its amœboid activity and its tenuity easily distinguish it from this species.

After a prolonged study of this parasite I believe then that its morphology differentiates it from any malaria parasite of man yet described.

I propose to call it *Plasmodium tenue*.

DESCRIPTION OF PLATES.

The figures were all drawn with an Abbé camera lucida at the same magnification, × 2300 (approx.).

Plate 14.—*Plasmodium falciparum*. Blood slide from Rhodesia; 35 parasites drawn at random.

Plate 15.—*Plasmodium tenue*. Blood slide from Central Provinces, India; 35 parasites drawn at random.

Plate 16.—*Plasmodium tenue*. Illustrating the irregularity of form of this parasite.

* I incline to the view, however, that this large form belongs to the other irregular forms, and hence that this parasite enlarges the cell and produces a stippling in it, and hence also that it has affinities with the simple tertian parasite, and *Plasmodium canis* of the dog rather than with the malignant tertian parasite.



